

Humdrum Tools II

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Melodic Searching

`tindex – themax – theloc`

Download data files for J.S. Bach chorales:

`humsplit h://371chorales`

Create *thema* search index:

`tindex *.krn > index.dat`

Search for the pitch sequence “c d e f g a b”:

`themax –p “c d e f g a b” index.dat --loc`

`chor190.krn::1 48-54 58-64`

`chor325.krn::1 17-23`

Convert matched note numbers into measure/beat locations:

`themax –p “c d e f g a b” index.dat --loc | theloc`

`chor190.krn::1 48=9B1-54=9B4 58=10B2-64=11B2.5`

`chor325.krn::1 17=5B1-23=6B3`

<http://extras.humdrum.org/man/tindex> (themax, theloc)

Marking search in data

chor190.krn::1

48=9B1-54=9B4

58=10B2-64=11B2.5

Chorale 190, first **kern spine (bass part)

First match on notes 48-54 which is in measure 9 starting on beat one and ending at beat 4.

Second match on notes 58-64 starting at m10 beat 2 and ending at m11 beat 2.5

Marking match in original data:

themax -p "c d e f g a b" index.dat --loc | theloc -m

(only first entry in themax results will be processed)

@ sign is a "user-definable signifier"

!!!RDF**kern: @ = matched note

=9	=9	=9	=9
8CL@	4c	4g	4ee
8D@	.	.	.
8E@	[4c	4g	4ee
8FJ@	.	.	.
8GL@	4c]	4g	4dd
8A@	.	.	.
8B@	[4B	8gL	4dd
8GJ	.	8fJ	.
=10	=10	=10	=10
8AAL	4B]	2e	2cc
8BB	.	.	.
8C@	[4A	.	.
8DJ@	.	.	.
2E;@	4A]	2e;	2b;
.	4G#;	.	.
=11	=11	=11	=11
8FFL@	8AL	4c	4a
8GGn@	8BJ	.	.
8AA@	4c	4f	4a
8BBJ@	.	.	.
8CL	4c	4f	4g
8D	.	.	.
8E	8cL	[4e	4g
8CJ	8B-J	.	.
=12	=12	=12	=12

Displaying matches in graphical notation

```
themax -p "c d e f g a b" index.dat --loc | head -n1 | theloc -m | myank -m 9-11 > match.krn
```

```
cat match.krn | autostem | hum2muse | muse2ps =z21j | pstopnm -dpi=300 \
| convert - -trim -resize '33%' match.png
```



```
themax -p "c d e f g a b" index.dat --loc | head -n1 | theloc -m | myank --marks > match.krn
```

Parallel feature searching

Search for the pitch sequence “cdefgab” only going upwards:

```
themax -p "cdefgab" -C "uuuuuu" index.dat --loc  
  chor190.krn::1 48-54  
  chor325.krn::1 17-23
```

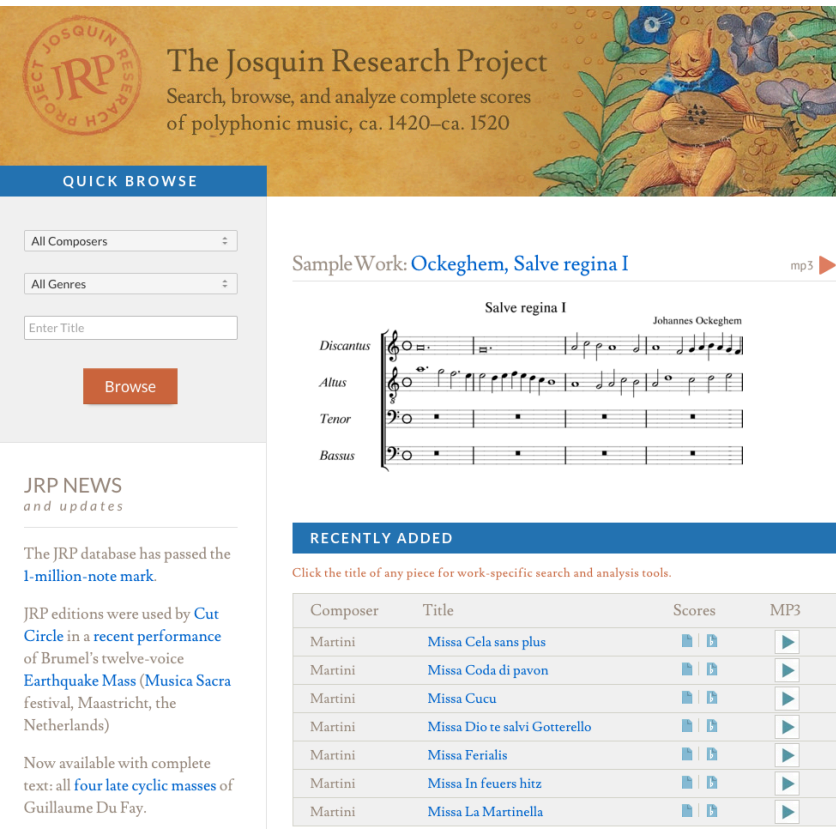
pitch: cdefgab
contour: up up up up up up

Prevent matches across fermatas:

```
tindex --fermata *.krn > index2.dat  
themax -p "cdefgab" index2.dat --loc  
  chor190.krn::1 48-54  
  chor325.krn::1 17-23
```

Josquin Research Project website

- front-end for tindex/themax/theloc
<http://josquin.stanford.edu>



The Josquin Research Project
Search, browse, and analyze complete scores
of polyphonic music, ca. 1420–ca. 1520

QUICK BROWSE

All Composers
All Genres
Enter Title

Browse

JRP NEWS
and updates

The JRP database has passed the
1-million-note mark.

JRP editions were used by Cut
Circle in a recent performance
of Brumel's twelve-voice
Earthquake Mass (Musica Sacra
festival, Maastricht, the
Netherlands)

Now available with complete
text: all four late cyclic masses of
Guillaume Du Fay.

Sample Work: Ockeghem, Salve regina I

mp3

Salve regina I
Johannes Ockeghem

Discantus
Altus
Tenor
Bassus

RECENTLY ADDED

Click the title of any piece for work-specific search and analysis tools.

Composer	Title	Scores	MP3
Martini	Missa Cela sans plus		
Martini	Missa Coda di pavon		
Martini	Missa Cucu		
Martini	Missa Dio te salvi Gotterello		
Martini	Missa Ferialis		
Martini	Missa In feuers hitz		
Martini	Missa La Martinella		

SEARCH

Enter Pitch

Enter Interval

Enter Rhythm

All Composers

All Genres

Search

themax input fields

-D option
(diatonic search
ignoring accidentals)
Interval: -I
Rhythm: -u









































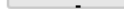







































JRP Search Results

search results for diatonic pitch sequence “cdefgab”:

Search Results for Pitch: "cdefgab"

375 matches in 170 works/246 movements

< 1 ... 6 ... 13 > view all

Match Locations	Composer	Title	Voices	Scores	MP3
6 	Josquin	Magnificat quarti toni	4	 	
2 	Josquin	Missus est Gabriel	5	 	
2 	Josquin	Responsum acceperat Simeon	6	 	
2 	Josquin	Tulerunt Dominum	4	 	
2 	Josquin	Verbum caro factum est	5	 	
1 	Josquin	Ave verum corpus	2-3	 	
3 	Josquin	Ave verum corpus	5	 	
2 	Josquin	Magnus es tu, domine	4	 	
1 	Josquin	Victime paschali laudes	6	 	
2 	Josquin	Ave maris stella	4	 	
1 	Josquin	Monstra te esse matrem	4	 	
4 	Josquin	Ave virgo sanctissima	5	 	
1 	Josquin	Nesciens mater virgo	5	 	
1 	Josquin	Regina celi letare	4	 	
1 	Josquin	Regina celi letare	4	 	
1 	Josquin	Salve regina	6	 	
1 	Josquin	Stabat mater/Comme femme	5	 	
1 	Josquin	Gloria laus et honor	4	 	
1 	Josquin	Sancta trinitas	6	 	
1 	Josquin	Cela sans plus	3	 	



count and location of matches within score

Graphical display of search results

- Click on location thumbnail to view score with matches highlighted:



Themefinder/Kernscores

Themefinder

[About | Search options | Help]
[New Links | Composers | Random]

[Take the Quartet Quiz.](#)

Repertory	Classical	type of music to search
Pitch		A=♭, sharp=♯, flat=♭ e.g. C E- G F♯
Interval		maj=♯, min=♭, aug=♯, dim=♭ per=♯, fifth=5, up=+, down=-, e.g. +m9 -p8 +m3 p1
Scale Degree		do=1, re=2, mi=3, fa=4, so=5, la=6, ti=7 (mode insensitive). e.g. 34554321
Gross Contour		up=/, down=\, unison=-. e.g. / / \ - / or uudsu
Refined Contour		up step=u, up leap=U, down step=d, down leap=D, same=s. e.g. uUDsdu
Location	<input checked="" type="radio"/> beginning of theme only, or <input type="radio"/> anywhere in theme	
Key	Any Mode: Any	
Meter	/	

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Search Engine

The Josquin Research Project

Search, browse, and analyze complete scores of polyphonic music, ca. 1420–ca. 1520

QUICK BROWSE

All Composers
All Genres
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JRP editions were used by [Cut Circle](#) in a recent performance of Brumel's twelve-voice [Earthquake Mass](#) (Musica Sacra festival, Maastricht, the Netherlands)

Now available with complete text: all [four late cyclic masses](#) of Guillaume Du Fay.

Sample Work: Ockeghem, Salve regina I

mp3

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Martini	Missa Perialis		
Martini	Missa In feuers hitz		
Martini	Missa La Martinella		

Kern Scores

A library of virtual musical scores in the Humdrum ****kern** data format.
Total holdings: 7,866,496 notes in 108,703 files.

search:
[browse](#) | [shortcuts](#) ☐ anchored

[A guided tour of the KernScores website](#)
[Recent additions to the KernScores library](#)
[Data Collection Highlights](#)

[Online Humdrum Editor](#)
[CCARH Humdrum Portal](#)
[Contribute kern scores](#)

Composers

Adam	Chopin	Giovannelli	Lassus	Schubert
Alkan	Clementi	Grieg	Liszt	Schumann
J.S. Bach	Corelli	Haydn	MacDowell	Scriabin
Banchieri	Dufay	Himmel	Mendelssohn	Sinding
Beethoven	Dunstable	Hummel	Monteverdi	Sousa
Billings	Field	Isaac	Mozart	Turpin
Bossi	Flecha	Ives	Pachelbel	Scarlati
Brahms	Foster	Joplin	Prokofiev	Vecchi
Buxtehude	Freseobaldi	Josquin	Ravel	Victoria
Yrd	Gershwin	Landini	Scarlati	Vivaldi
				Weber

Genres

allate	Etudes	Motets	Scherzos	Symphonies
allads	Fugues	Preludes	Sonatas	Virelais
horales	Madrigals	Ragtime	Sonatina	Waltzes
contrafacta	Mazurkas	Quartets		

Score Database

Harmonic searching

Are there more major or minor sonorities in Bach chorales:

```
tntype *.krn | grep 3-11A | wc -l
```

5225

```
tntype *.krn | grep 3-11B | wc -l
```

10625

3-11 == “Forte number”: 3 pitch classes in the 11th most compact configuration.

3-11A = most compact inversion of pitch classes (minor triad)

3-11B = least compact inversion of pitch classes (major triad)

In minor keys, are there more major or minor sonorities:

```
tntype `egrep '^\[a-g\].?\' *.krn` | grep 3-11A | wc -l
```

```
tntype `egrep '^\[a-g\].?\' *.krn` | grep 3-11B | wc -l
```

cint

The image displays two systems of musical notation. The top system shows a two-staff excerpt from a Bach chorale. The first staff has notes on the treble clef, and the second staff has notes on the bass clef. Intervals are labeled with numbers: 10, 12, -2, and 2. The bottom system shows the same two-staff excerpt, but with a plus sign and a sequence of intervals: (10 -2 12 2 8) + (10 -2 12) + (12 2 8). The intervals are color-coded: 10 is blue, -2 is red, 12 is blue, 2 is red, and 8 is blue.

Search for parallel 6ths in Bach chorales:

```
cint h://370chorales --raw -Uo | grep '^6.*6$' | sortcount -pt
```

- U = don't extract repeated noted modules
- o = collapse compound intervals to within an octave (octave + 6th → 6th)
- raw = output modules, don't embed within score

cint

What is the most common parallel motion?

```
for var in `seq 1 8`  
do  
    echo Number of parallel motions for $var:  
    cint *.krn --raw -Uo | grep "^$var .* $var$" | wc -l  
done
```

Bach Chorales:

Number of parallel motions for 1:	2
Number of parallel motions for 2:	22
Number of parallel motions for 3:	5437
Number of parallel motions for 4:	1950
Number of parallel motions for 5:	135
Number of parallel motions for 6:	4890
Number of parallel motions for 7:	35
Number of parallel motions for 8:	9

Total number of modules: `cint *.krn --raw -Uo | wc -l` 69418

18% of music
involves
parallel motion

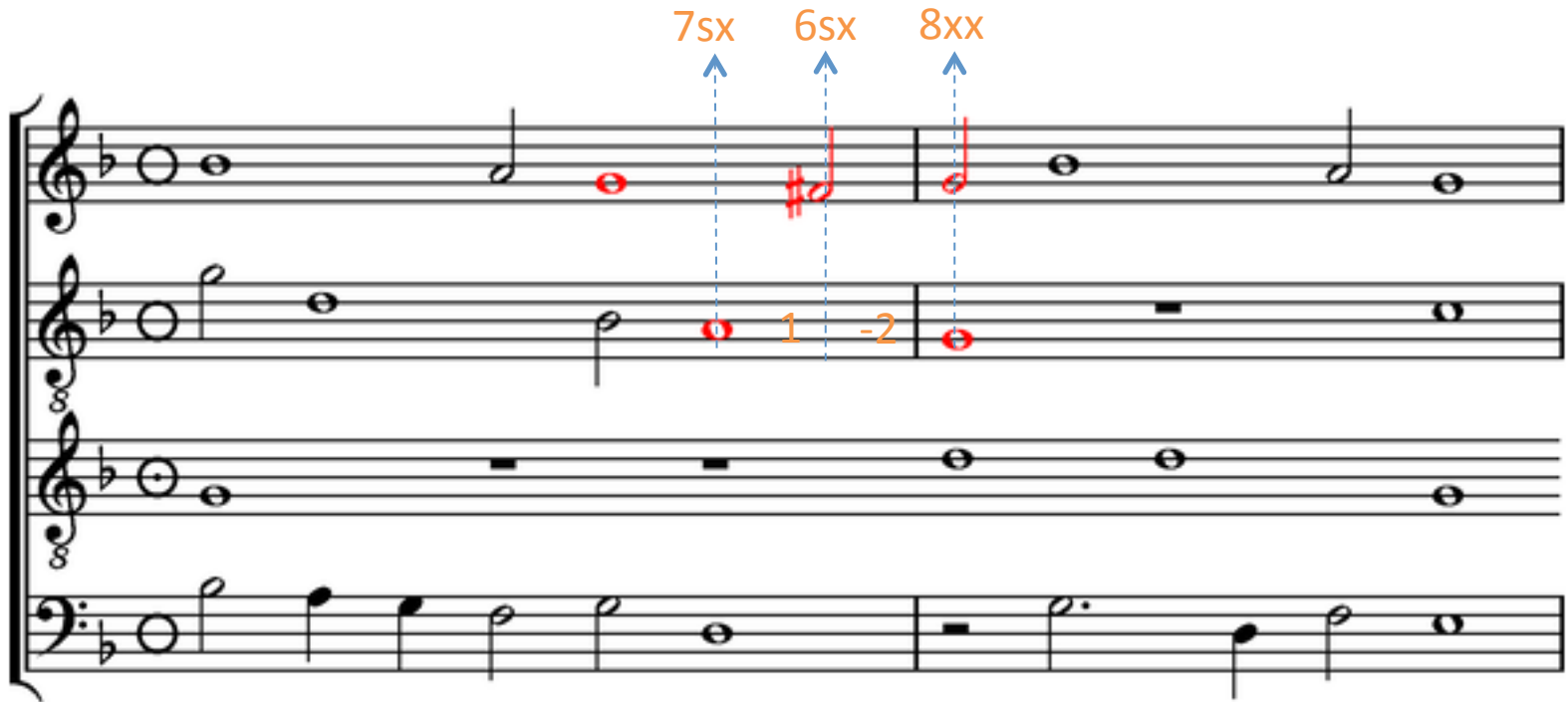
Cint searching

cint --search "7xs 1 6sx -2 8xx" -x -n 2 jrp://Bus1001a

-x: add attack states

-n2: 2 module chain

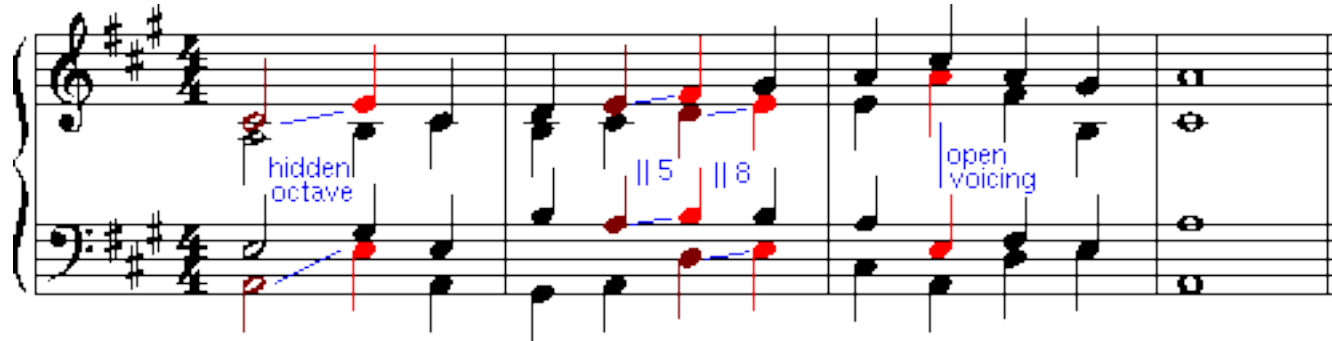
| myank -m 7-8 | hum2muse | muse2ps =z21j



chorck

Like “proof”: checks data semantics

<http://extras.humdrum.org/man/chorck>



`chorck h://371chorales/chor008.krn -w`

- 3. Contrary parallel 5th between tenor and soprano on line 26
- 3. Contrary parallel 5th between tenor and soprano on line 40
- 3. Contrary parallel 5th between tenor and soprano on line 52
- 5. Hidden 5th between soprano and alto on line 54
- 5. Hidden 5th between soprano and bass on line 54
- 5. Hidden 5th between soprano and tenor on line 70
- 5. Hidden 5th between soprano and bass on line 70
- 5. Hidden 5th between soprano and tenor on line 85
- 8. Open spacing between alto and tenor on line 120
- 8. Open spacing between alto and tenor on line 121
- 3. Contrary parallel 5th between tenor and soprano on line 125
- 5. Hidden 5th between soprano and tenor on line 137
- 5. Hidden 5th between soprano and tenor on line 146
- 7. Voice crossing between tenor and bass on line 154
- 8. Open spacing between alto and tenor on line 154
- 7. Voice crossing between tenor and bass on line 155
- 8. Open spacing between alto and tenor on line 155

satb2gs

Convert 4-part SATB score to grand staff score:

parallel h://371chorales/chor008.krn | satb2gs | autostem | hum2muse \
| muse2ps =z14v120,120j | pstopnm -dpi=300 | convert - -trim output.png

Freuet euch, ihr Christen alle

J.S. Bach

The image displays a grand staff musical score for J.S. Bach's chorale "Freuet euch, ihr Christen alle". The score is written for a grand staff, consisting of two staves (treble and bass clef) joined by a brace. The key signature is B-flat major (two flats), and the time signature is common time (C). The score is divided into three systems, with measure numbers 7, 14, and 21 indicated at the beginning of each system. The music features a variety of note values, including quarter, eighth, and sixteenth notes, as well as rests. Some notes are highlighted in red, likely indicating specific melodic lines or chords. The score concludes with a double bar line at the end of the third system.

JRP Analysis Tool: dissonant

dissonant jrp://Jos2721 | myank -m 10-15

**kern	**text	**kern	**text	**kern	**text
=10	=10	=10	=10	=10	=10
4A]	.	1.f	.	4cc]	.
4G>	T7	.	.	4b	.
4F	.	.	.	4a	.
4E<	T2	.	.	4g<	T-2
2D	.	.	.	2a	.
[2A	.	2e	.	[2cc	.

http://josquin.stanford.edu/data?a=dissonantpdf&f=Jos2721-La_Bernardina

10

T-2 T-2 T-2

C-2,S2

T7 T2 T7 T2 T4 T7,S7 S7

<http://museinfo.sapp.org/examples/humdrum/dissonant.cpp>

dissonant

dissonant h://371chorales/chor008.krn | extractx -i'**kern' | satb2gs | autostem | \
hum2muse | muse2ps =z14jv120,100 | pstopnm -dpi=300 | convert - -trim output.png

Freuet euch, ihr Christen alle

J.S. Bach

The image displays a musical score for a chorale by J.S. Bach, titled 'Freuet euch, ihr Christen alle'. The score is written for a four-part vocal ensemble (Soprano, Alto, Tenor, Bass) and a keyboard accompaniment (likely organ or harpsichord). The key signature is B-flat major (two flats), and the time signature is common time (C). The score is divided into three systems, with measures 7, 14, and 21 marked at the beginning of each system. The notation includes various musical symbols such as notes, rests, and accidentals. The notes are color-coded: green for Soprano, red for Alto, blue for Tenor, and black for Bass. The keyboard part is written in a grand staff (treble and bass clefs). The score is presented in a clean, professional layout with a white background and black text.

dissonant/abcm2ps

dissonant h://371chorales/chor008.krn | extractx -i'**kern' | satb2gs | autostem | hum2abc \
| abcm2ps -s 0.8 - -O - | pstopnm -dpi=300 | convert - -trim output.png

8. Freuet euch, ihr Christen alle

Johann Sebastian Bach

The image displays a musical score for the chorale "Freuet euch, ich Christen alle" by Johann Sebastian Bach. The score is presented in five systems, each consisting of a treble and bass staff. The key signature is B-flat major (two flats), and the time signature is common time (C). The notation includes various musical symbols such as notes, rests, and bar lines. Red and green circles are placed around specific notes in the bass staff of each system, highlighting areas of dissonance. The first system starts with a treble staff containing a whole note chord and a bass staff with a whole note chord. The second system begins with a measure number '5' above the treble staff. The third system begins with a measure number '9' above the treble staff. The fourth system begins with a measure number '13' above the treble staff. The fifth system begins with a measure number '17' above the treble staff. The score concludes with a double bar line and repeat dots in the final measure of the fifth system.

dissonant/abcm2ps

dissonant h://371chorales/chor008.krn | extractx -i'***kern' | myank -m13-15 | satb2gs \
| hum2abc | abcm2ps - -O - | pstopnm -dpi=300 | convert - -trim output.png

8. Freuet euch, ihr Christen alle

Johann Sebastian Bach

13

4th below tenor
2nd below alto
2nd above soprano

=13	=13	=13	=13
8FFL	4c	4a-	4ff
8GG <>	.	.	.
8AA-	4c	4a-	4ff
8BB-J<>	.	.	.
8CL	4c	4g	4ee-X
8D ><	.	.	.
8E-	4c	4g	4ee-
8FJ<>	.	.	.

JRP Analysis Tool: parallel

<http://josquin.ccarh.org/data?composer=Joa&repertory=parallel>

```
for i in `seq -w 371`  
do  
    echo \!\\chorale $i  
    parallel -l h://371chorales/chor$i.krn  
done | less
```

```
parallel h://371chorales/chor008.krn | autostem | hum2muse | muse2ps =z6j \  
| pstopnm -dpi=300 | convert - -trim output.png
```

Freuet euch, ihr Christen alle

J.S. Bach

Soprano

Alto

Tenor

Bass

The image displays a musical score for a chorale by J.S. Bach. The title 'Freuet euch, ihr Christen alle' is centered above the staves. The score is written for four voices: Soprano, Alto, Tenor, and Bass. It consists of two systems of four staves each. The music is in G major (one sharp) and 4/4 time. The notation includes various musical symbols such as notes, rests, and bar lines. Some notes are highlighted in red, possibly indicating specific intervals or melodic lines. The overall layout is clean and professional, typical of a printed musical score.